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Gasification and Power Generation using IGCC or Fuel Cells

Neal Richter

Gasification and IGCC – where are they today?

- *Gasification is a commercial process using a variety of feeds for many purposes.*
- *It meets strict environmental requirements.*
- *Mercury can be recovered and CO_2 captured for sequestration comparatively easily.*

Gasification and IGCC – where are they today? (cont.)

- *IGCC has been used successfully in a limited number of plants.*
- *Reliability problems are being overcome.*

Gasification and IGCC – where are they today? (cont.)

BUT, Capital costs are too high, efficiency is too low and reliability must be demonstrated.

Environmental advantages and feedstock flexibility are not sufficient to overcome these other shortfalls. Carbon sequestration is yet to come.

Costs, efficiency and on-stream are site specific, and uncertain, but, for talking purposes;

IGCC today	*3-5 years*	*10 years*
$1500/kW	*1000*	*<1000*
42%(HHV)	*45-48%*	*>50%*

And substantially better wanted by 2020!!

These are S T R E C H goals. But, not impossible to achieve.

- *Will not be reached by incremental optimization.*
- *Requires new ideas, maybe new generation systems – gasifier and turbine.*
- *All aspects of the system must be improved: gasification, power block and integration.*

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Gasification:

- *Thermodynamics allows a significant improvement.*
- *R&D underway looking at feed system, injectors, the gasifier and overall system simplification.*
- *Includes developments to extend the range of feeds that can be gasified efficiently, such as lignite, which can reduce electricity cost.*

Power Block – Turbine

- *Higher efficiency – always.*
- *Cleaner – always.*
- *Cheaper – always.*
- *Operable with syngas, and eventually H_2 with no penalty in efficiency. Effects from both gasifier efficiency and from carbon sequestration.*

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Overall System Design

- *Changes in gasification, gas treatment and turbine will necessitate new integrations.*
- *Likewise, changes in the system and the need to meet performance goals may dictate changes in the turbine.*
- *Can't work on any part of an IGCC in a vacuum.*

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Questions? Comments?

Neal Richter
richtgn@ChevronTexaco.com